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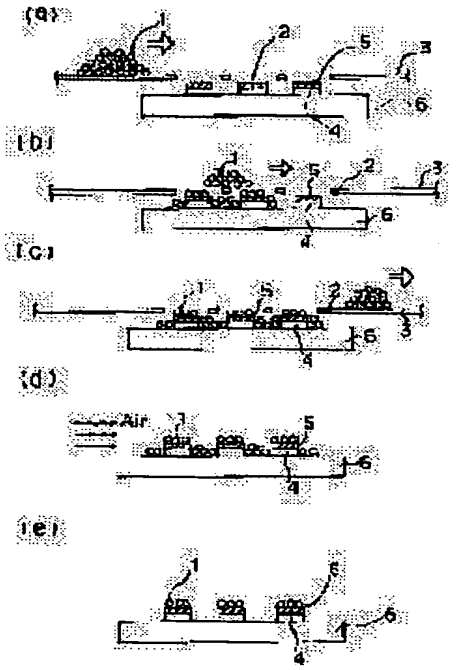
(54) METHOD FOR CONNECTING ELECTRONIC PART

(57)Abstract:
PURPOSE: To eliminate the generation of shortcircuitting between electrodes adjacent to each other, and to reduce the unevenness of connection resistance by including a process for arranging a perforated plate member on an electrode terminal of an electronic part and a process for arranging conductive grains on the electrode terminal.
CONSTITUTION: A perforated plate member 3 having a perforated part 2, through which conductive grains 1 can be passed, and a circuit board 6 made of a TAB base film, on which the adhesive agent 5 is transferred on electrodes 4, are held so that the perforated part 2 and the electrode 4 are positioned to each other. Next, the conductive grains 1 are moved on the perforated plate member 3 and arranged on the electrode 4. At this stage, the circuit board 6 and the perforated plate member 3 are separated by a specified distance to arrange only one layer of the conductive grains 1 on the electrode 4. Next, the grains 1 entering between the electrodes 4 is eliminated by air blow, and the electrode 4 and an electrode of another circuit board are connected to each other by the insulating adhesive agent through the conductive grains 1. Wiring structure, which can reduce the unevenness of the connection resistance, is thereby obtained.



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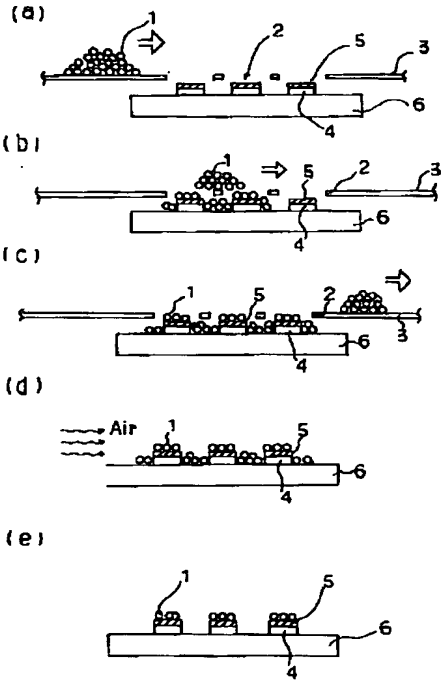
(54)【発明の名称】　電子部品の接続方法

(57)【要約】

【目的】　本発明は、電子部品の接続方法に関し、隣接電極間でショートさせることなくファインピッチに対応することができるとともに、各電極上の導電粒子の粒子数を一定にして各電極間の接続抵抗のばらつきを小さくすることができる電子部品の接続方法を提供することを目的とする。

【構成】　第１の電子部品の電極端子と第２の電子部品の電極端子とを導電粒子を介して電気的に接続し、該第１の電子部品と該第２の電子部品とを絶縁性接着剤により固定する電子部品の接続方法において、該導電粒子が通過できる開孔部を有する開孔板部材を、該開孔部が該電極端子上に来るように該電子部品上に配置する工程と、次いで、該導電粒子を該開孔板部材の該開孔部を通過させて該開孔部内の該電極端子上に配列する工程とを含むように構成する。



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【特許請求の範囲】

【請求項１】第１の電子部品の電極端子と第２の電子部品の電極端子とを導電粒子を介して電気的に接続し、該第１の電子部品と該第２の電子部品とを絶縁性接着剤により固定する電子部品の接続方法において、該導電粒子が通過できる開孔部を有する開孔板部材を、該開孔部が該電極端子上に来るように該電子部品上に配置する工程と、次いで、該導電粒子を該開孔板部材の該開孔部を通過させて該開孔部内の該電極端子上に配列する工程とを含むことを特徴とする電子部品の接続方法。

【請求項２】前記開孔板部材は、厚さが前記導電粒子の粒径よりも小さいメッシュからなることを特徴とする請求項１記載の電子部品の接続方法。

【請求項３】前記開孔板部材は、開孔部の幅が前記導電粒子の粒径の２倍よりも小さいメッシュからなることを特徴とする請求項２記載の電子部品の接続方法。

【請求項４】前記開孔板部材は、所定の径及び所定の数の穴が所定のパターンで形成されたマスクからなることを特徴とする請求項１記載の電子部品の接続方法。

【請求項５】前記開孔板部材は、穴径が前記導電粒子の粒径の２倍よりも小さいマスクからなることを特徴とする請求項４記載の電子部品の接続方法。

【請求項６】前記導電粒子を前記開孔板部材の前記開孔部に通過させる際、該導電粒子を磁石の磁力により該開孔部内の前記電極端子方向に吸引することを特徴とする請求項１乃至５記載の電子部品の接続方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、電子部品の接続方法に係り、詳しくは、液晶ディスプレイと外部駆動回路（ＴＡＢ）等の電気回路部品（配線基板）の接続技術に適用することができ、特に、隣接電極間でショートさせることなくファインピッチに対応することができるとともに、各電極上の導電粒子の粒子数を一定にして各電極間の接続抵抗のばらつきを小さくすることができる電子部品の接続方法に関する。

【０００２】

【従来の技術】従来、電極端子の相互接続方法については、例えば特開平３－２８９０７０号公報で報告されたものがあり、ここでは、接着剤が形成された電極端子に導電粒子を選択的に配置して接続を得る方法であり、具体的には、第１の電気回路基体の電極端子と第２の電気回路基体の電極端子とを導電性微粒子を介して相互に電気的に接続させ、接着剤により保持固定する電極端子の相互接続方法において、少なくとも一方の電気回路基体の基材表面より突出した電極端子に、接着剤を形成し、該接着剤に導電性微粒子を付着した後、第１の電気回路基体と第２の電気回路基体を絶縁性接着剤を用いて、圧接、接続するように構成することにより、高密度に配列された電極端子を隣接する電極端子の電気的絶縁を保ち

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つつ接続できるという利点を有する。

【０００３】さて、従来、導電粒子介在型の電子部品の接続方法には、大きく分けて２種類あり、１つは、前述した公知例の如く、導電粒子を一方の回路基板の電極上に固定してから他方の回路基板と接続することでファインピッチに対応する方法であり、もう１つは、異方性導電膜等接着剤中に導電粒子を分散させたものを介して上下回路基板を接続する方法である。

【０００４】

【発明が解決しようとする課題】しかしながら、上記した導電粒子を分散させた接着剤を介して上下回路基板を接続する従来の方法では、ファインピッチに対応するために接着剤中の導電粒子の粒子密度を高くすると、隣接する電極間にも導電粒子が存在するため、隣接電極間でショートし易いという問題があった。

【０００５】また、上記した公知例の特開平３－２８９０７０号公報の従来の方法では、予め一方の回路基板の電極上に導電粒子を固定してから上下回路基板を接続しているため、上記した導電粒子が分散された接着剤を用いる場合よりもファインピッチに対応できるという利点を有する。しかしながら、この方法では、平面基板上に導電粒子を電界中で散布して並べ、接着剤層が形成された回路基板の電極を導電粒子が散布された平面基板に密着させることにより、導電粒子を回路基板の電極上に配列しており、このように散布により導電粒子を平面基板上に並べると、平面基板上の導電粒子の配列密度がばらつき、この結果、回路基板の電極上に配列される導電粒子の数もばらついてしまう。

【０００６】このため、各電極上の導電粒子の粒子数が変化し易く、このように、電極上の導電粒子の粒子数が変化すると、各電極間で接続抵抗のバラツキが大きくなるという問題があった。また、平面基板上での導電粒子の密度が極端に低くなると、オープン電極を生じてしまうこともあった。そこで、本発明は、隣接電極間でショートさせることなくファインピッチに対応することができるとともに、各電極上の導電粒子の粒子数を一定にして各電極間の接続抵抗のばらつきを小さくすることができる電子部品の接続方法を提供することを目的としている。

【０００７】

【課題を解決するための手段】請求項１記載の発明は、第１の電子部品の電極端子と第２の電子部品の電極端子とを導電粒子を介して電気的に接続し、該第１の電子部品と該第２の電子部品とを絶縁性接着剤により固定する電子部品の接続方法において、該導電粒子が通過できる開孔部を有する開孔板部材を、該開孔部が該電極端子上に来るように該電子部品上に配置する工程と、次いで、該導電粒子を該開孔板部材の該開孔部を通過させて該開孔部内の該電極端子上に配列する工程とを含むことを特徴とするものである。

【０００８】請求項２記載の発明は、上記請求項１記載の発明において、前記開孔板部材は、厚さが前記導電粒子の粒径よりも小さいメッシュからなることを特徴とするものである。請求項３記載の発明は、上記請求項２記載の発明において、前記開孔板部材は、開孔部の幅が前記導電粒子の粒径の２倍よりも小さいメッシュからなることを特徴とするものである。

【０００９】請求項４記載の発明は、上記請求項１記載の発明において、前記開孔板部材は、所定の径及び所定の数の穴が所定のパターンで形成されたマスクからなることを特徴とするものである。請求項５記載の発明は、上記請求項４記載の発明において、前記開孔板部材は、穴径が前記導電粒子の粒径の２倍よりも小さいマスクからなることを特徴とするものである。

【００１０】請求項６記載の発明は、上記請求項１乃至５記載の発明において、前記導電粒子を前記開孔板部材の前記開孔部に通過させる際、該導電粒子を磁石の磁力により該開孔部内の前記電極端子方向に吸引することを特徴とするものである。

【００１１】

【作用】請求項１記載の発明では、第１の電子部品の電極端子と第２の電子部品の電極端子とを導電粒子を介して電気的に接続し、該第１の電子部品と該第２の電子部品とを絶縁性接着剤により固定する電子部品の接続方法において、該導電粒子が通過できる開孔部を有する開孔板部材を、該開孔部が該電極端子上に来るように該電子部品上に配置した後、該導電粒子を該開孔板部材の該開孔部を通過させて該開孔部内の該電極端子上に配列するように構成する。

【００１２】このため、開孔板部材の開孔部を導電粒子が所定数だけ入るように構成し、この開孔部が電極端子上の所定位置に来るように開孔板部材を電子部品上に配置して、所定数の導電粒子を開孔部に通過させて開孔部内の電極端子上に配列することができるので、電子部品の電極上の所定位置に所定数の導電粒子を配列することができる。従って、隣接電極間に導電粒子が来ないように配置することができ、隣接電極間でオープンショートさせることなくファインピッチに対応することができる。しかも、各電極上の所定位置に所定数だけ導電粒子を形成することができるので、各電極上の導電粒子の粒子数を一定にすることができ、各電極間の接続抵抗のばらつきを小さくすることができる。

【００１３】請求項２記載の発明では、上記請求項１記載の発明において、前記開孔板部材を、厚さが前記導電粒子の粒径よりも小さいメッシュからなるように構成する。このため、導電粒子の粒径より厚いメッシュにすると、開孔部に導電粒子が２層以上で積まれ、メッシュを取り除いた時に導電粒子が溢れ落ちて配列が乱れてしまうが、上記の如く、厚さが導電粒子の粒径よりも小さいメッシュにすると、開孔部に充填する導電粒子を一層にすることができるので、メッシュを電子部品から取り除いた時、配列が乱れないように確実に導電粒子を電極端子上に一層で配列することができる。なお、この時、電極端子上に接着剤層があるのが望ましい。しかも、このメッシュを用いて電極端子上の開孔部の数を等しくすることで導電粒子の数をより精度良く制御することができる。

【００１４】請求項３記載の発明では、上記請求項２記載の発明において、前記開孔板部材を、前記開孔部の幅が前記導電粒子の粒径の２倍よりも小さいメッシュからなるように構成する。このため、メッシュの開孔部の幅を１個の導電粒子しか通過できない幅にして、１つの開孔部から１つの導電粒子を通過させることができるので、電極端子上の開孔部の数を等しくすることで各電極端子上の導電粒子の数を等しくすることができる。

【００１５】請求項４記載の発明では、上記請求項１記載の発明において、前記開孔板部材を、所定の径及び所定の数の穴が所定のパターンで形成されたマスクからなるように構成する。このため、上記請求項１記載の発明の効果を得ることができるうえ、電極間をマスクで覆い、かつ電極上のみにマスク穴が来るように構成することで電極間に導電粒子が入り込まないようにすることができるので、電極間に入り込んだ導電粒子を取り除くためのエアーブローをしないで済ませることができ、しかも、穴の位置を適宜変えることで電極端子上での導電粒子の位置を適宜変えることができる。更に、各開孔部パターンを適宜変えることができるので、広範に対応することができる。

【００１６】請求項５記載の発明では、上記請求項４記載の発明において、前記開孔板部材を、径が前記導電粒子の粒径の２倍よりも小さいマスクからなるように構成する。このため、マスクの穴径を１個の導電粒子しか通過できない大きさにすることができるので、上記請求項３記載の発明と同様の効果を得ることができる。請求項６記載の発明では、上記請求項１乃至５記載の発明において、前記導電粒子を前記開孔部に通過させる際、該導電粒子を磁石の磁力により該開孔部内の前記電極端子方向に吸引するように構成する。このため、磁石の磁力により導電粒子に対して開孔部内の電極端子方向の力を与えて導電粒子を開孔部に通過し易くすることができるので、導電粒子を開孔部内の電極上に確実に配列することができる。

【００１７】

【実施例】以下、本発明の実施例を図面を参照して説明する。

（実施例１）図１は本発明（請求項１）の実施例１に則した電子部品の接続方法を示す図である。本実施例では、図１（ａ）に示すように、導電粒子１が通過可能な開孔部２を有する開孔板部材３と電極４上に接着剤５の転写されたＴＡＢベースフィルムからなる回路基板６を

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開孔部２と電極４が揃うように左右方向の位置合わせを行い、各々の開孔板部材３と回路基板６を保持する。この時、上下方向では、図２に示す如く、開孔部２を通過して電極４上に配列された導電粒子１の頭部と開孔板部材３の上端部が同じ高さとなるように開孔板部材３と回路基板６を特定の距離Ｌだけ離すようにする。

【００１８】次に、図１（ｂ），（ｃ）に示すように、導電粒子１を開孔板部材３上で移動させることにより、導電粒子１を開孔部２を通過させて開孔部２内の電極４上に配列する。この時、回路基板６と開孔板部材３は、特定の距離だけ離しているため、導電粒子１は電極４上に１層のみ配列される。　次に、図１（ｄ），（ｅ）に示すように、電極４間に入り込んだ導電粒子１をエアーブローで取り除くことにより、接着剤５が形成された電極４上にだけ導電粒子１を配列する。

【００１９】そして、回路基板６の電極４と別の回路基板等の電極とを導電粒子１を介して絶縁性接着剤で接続することにより、配線構造を得ることができる。このように、本実施例では、導電粒子１が通過できる開孔部２を有する開孔板部材３を、開孔部２が電極端子４上に来るように回路基板６上に配置した後、導電粒子１を開孔板部材３の開孔部２を通過させて開孔部２内の電極端子４上に配列するように構成している。このため、開孔板部材３の開孔部２を導電粒子１が所定数だけ入るように構成し、この開孔部２が電極端子４上の所定位置に来るように開孔板部材３を回路基板６上に配置して、所定数の導電粒子１を開孔部２に通過させて開孔部２内の電極端子４上に配列することができるので、回路基板６の電極４上の所定位置に所定数の導電粒子１を配列することができる。従って、隣接電極４間に導電粒子１が来ないように配置することができ、隣接電極４間でオープンショートさせることなくファインピッチに対応することができる。しかも、各電極４上の所定位置に所定数だけ導電粒子１を形成することができるので、各電極４上の導電粒子１の粒子数を一定にすることができ、各電極４間の接続抵抗のばらつきを小さくすることができる。

（実施例２）図３は本発明（請求項２）の実施例２に則した電子部品の接続方法を示す図である。本実施例では、回路基板６には、ＴＡＢベースフィルム（ピッチ０．２０ｍｍ、電極４幅０．１ｍｍ、電極４高さ３５μｍ）からなるものを用い、導電粒子１には、ミクロパールＡｕ（核が樹脂で外側にＮｉメッキ、その外側にＡｕメッキ、粒径４０μｍ）からなるものを用いる。本実施例では、まず、電極４上にＵＶ硬化型接着剤５を１０μｍの厚さで形成したＴＡＢベースフィルム回路基板６と、図３（ｅ），（ｆ）に示す開孔部２の幅が８０μｍで線幅が２０μｍ（ピッチは０．１０ｍｍでＴＡＢ電極４ピッチの１／２）、及び厚さが２０μｍのメッシュからなる開孔板部材３とを、図３（ａ）に示すように、メッシュ開孔板部材３下端とＴＡＢベースフィルム回路基

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板６上端の距離を４５μｍ離して保持する。次いで、図３（ｂ）～（ｄ）に示すように、前述した実施例１と同様のプロセスに従って導電粒子１を開孔板部材３の開孔部２を通過させて接着剤５が形成された電極４上に配列する。なお、開孔板部材３を回路基板６から取り除いた後、電極４間に入り込んだ導電粒子１は、実施例１と同様エアーブローで取り除く。この時の導電粒子１の移動手段としては、スキージ７を用いる。また、メッシュ開孔板部材３の１つの開孔部２からは、４，３，２，１個の導電粒子１が通過するが、１電極４上の導電粒子数は、略等しくなる。

【００２０】そして、回路基板６の電極４と別の回路基板等の電極とを導電粒子１を介して接着剤で接続することにより、配線構造を得ることができる。このように、本実施例では、開孔板部材３を、厚さが導電粒子の粒径よりも小さいメッシュからなるように構成している。このため、導電粒子の粒径より厚いメッシュにすると、開孔部に導電粒子が２層以上で積まれ、メッシュを取り除いた時に導電粒子が溢れ落ちて配列が乱れてしまうが、上記の如く、厚さが導電粒子１の粒径よりも小さいメッシュ開孔板部材３にすると、開孔部２に充填する導電粒子１を一層にすることができるので、メッシュ開孔板部材３を回路基板６から取り除いた時、配列が乱れないように確実に導電粒子１を電極端子４上に一層で配列することができる。しかも、このメッシュ開孔板部材３を用いて電極端子４上の開孔部２の数を等しくすることで導電粒子１の数をより精度良く制御することができる。

（実施例３）図４は本発明（請求項４）の実施例３に則した電子部品の接続方法を示す図である。実施例２では、開孔板部材３にメッシュを用いる場合について説明したが、本実施例では、開孔板部材３にメッシュの代わりに図４（ｅ），（ｆ）に示す穴径８０μｍで厚さ２０μｍ、及びピッチ０．２０ｍｍのマスクからなる開孔板部材３を用いると、導電粒子１の配列プロセスは、図４（ａ）～（ｄ）に示す如く、実施例２と同様であるので、その説明は省略する。

【００２１】このように、本実施例では、開孔板部材３を、所定の径及び所定の数の穴が所定のパターンで形成されたマスクからなるように構成している。このため、電極４間をマスク開孔板部材３で覆い、かつ電極４のみにマスク穴２が来るように構成することで電極４間に導電粒子１が入り込まないようにすることができるので、エアーブローをしないで済ませることができ、しかも、穴の数及び位置を適宜変えることで電極端子４上での導電粒子１の数及び位置を適宜変えることができる。更に、各開孔部パターンを適宜変えることができるので、広範に対応することができる。

（実施例４）図５は本発明（請求項３）の実施例４に則した電子部品の接続方法を示す図である。本実施例では、回路基板６には、ＴＡＢベースフィルム（ピッチ

０．２４ｍｍ、電極４幅０．１２ｍｍ、電極４高さ４０μｍ）からなるものを用い、導電粒子１には、ミクロパールＡｕ（核が樹脂で外側にＮｉメッキ、その外側にＡｕメッキ、粒径３５０μｍ）からなるものを用いる。本実施例では、まず、電極４上にＵＶ硬化型接着剤５を１０μｍの厚さで形成したＴＡＢベースフィルム回路基板６と、図５（ｅ），（ｆ）に示す開孔部２の幅が４０μｍで線幅が２０μｍ（ピッチ６０μｍでＴＡＢ電極４ピッチの１／４）、及び厚さ２０μｍのメッシュからなる開孔板部材３を、図５（ａ）に示すように、メッシュ開孔板部材３下端とＴＡＢベースフィルム回路基板６の距離を５０μｍ離して保持して、図５（ｂ）～（ｄ）に示すように、前述した実施例１と同様のプロセスに従って電極４上に配列する。なお、開孔板部材３を回路基板６から取り除いた後、電極４間に入り込んだ導電粒子１は、実施例１と同様エアーブローで取り除く。導電粒子１の移動手段としては、スキージ７を用いる。この時、メッシュ開孔板部材３の１つの開孔部２からは、１個のみ導電粒子１が通過するので、１電極４上の導電粒子数は等しくなる。

【００２２】そして、回路基板６の電極４と別の回路基板等の電極とを導電粒子１を介して接着剤で接続することにより、配線構造を得ることができる。このように、本実施例では、開孔板部材３を、開孔部２の幅が導電粒子１の粒径の２倍よりも小さいメッシュからなるように構成している。このため、メッシュ開孔板部材３の開孔部２の幅を１個の導電粒子１が通過できない幅にして、１つの開孔部２から１つの導電粒子１を通過させることができるので、電極端子４上の導電粒子１の数を等しくすることができる。

（実施例５）図６は本発明（請求項５）の実施例５に則した電子部品の接続方法を示す図である。実施例４では、開孔板部材３にメッシュを用いる場合について説明したが、本実施例では、開孔板部材３にメッシュの代わりに図６（ｅ），（ｆ）に示す穴径４０μｍで厚さ２０μｍ、及びピッチ０．２４ｍｍのマスクからなる開孔板部材３を用いると、導電粒子１の配列プロセスは、図６（ａ）～（ｄ）に示す如く、実施例３と同様であるので、その説明は省略する。

【００２３】このように、本実施例では、開孔板部材３を、径が導電粒子１の粒径の２倍よりも小さいマスクからなるように構成している。このため、マスク開孔板部材３の穴径を１個の導電粒子１しか通過できない大きさにすることができるので、上記実施例４と同様の効果を得ることができる。

（実施例６）図７は本発明（請求項６）の実施例６に則した電子部品の接続方法を示す図である。本実施例では、請求項６に係る特徴部分のみを具体的に説明する。本実施例では、図７に示すように、ＴＡＢ回路基板６の下側に磁石８を配置し、導電粒子１にはＮｉメッキを施して構成する。

【００２４】このように、本実施例では、導電粒子１を開孔板部材３の開孔部２に通過させる際、導電粒子１を磁石の磁力により吸引するように構成する。このため、磁石の磁力により導電粒子１に開孔部２内の電極４方向の力を与えて開孔部２を通過し易くすることができるので、導電粒子１を電極４上に確実に配列することができる。

【００２５】

【発明の効果】本発明によれば、隣接電極間でショートさせることなくファインピッチに対応することができるとともに、各電極上の導電粒子の粒子数を一定にして各電極間の接続抵抗のばらつきを小さくすることができるという効果がある。

【図面の簡単な説明】

【図１】本発明の実施例１に則した電子部品の接続方法を示す図である。

【図２】本発明の実施例１に則した導電粒子と開孔板部材と回路基板との位置関係の詳細を示す図である。

【図３】本発明の実施例２に則した電子部品の接続方法を示す図である。

【図４】本発明の実施例３に則した電子部品の接続方法を示す図である。

【図５】本発明の実施例４に則した電子部品の接続方法を示す図である。

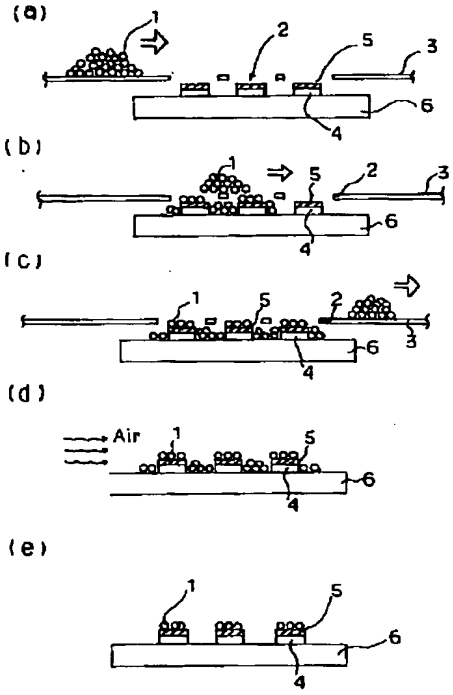
【図６】本発明の実施例５に則した電子部品の接続方法を示す図である。

【図７】本発明の実施例６に則した電子部品の接続方法を示す図である。

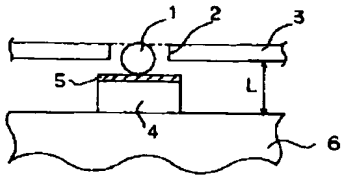
【符号の説明】

１　導電粒子
２　開孔部
３　開孔板部材
４　電極
５　接着剤
６　回路基板
７　スキージ
８　磁石

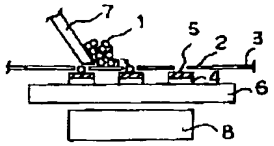
【図１】



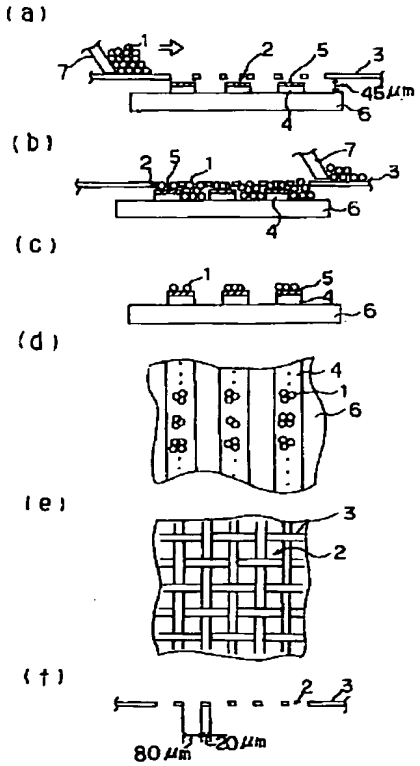
【図２】



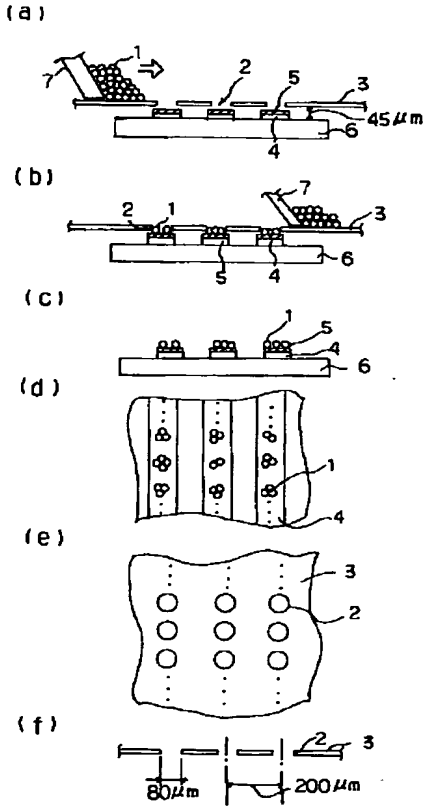
【図７】



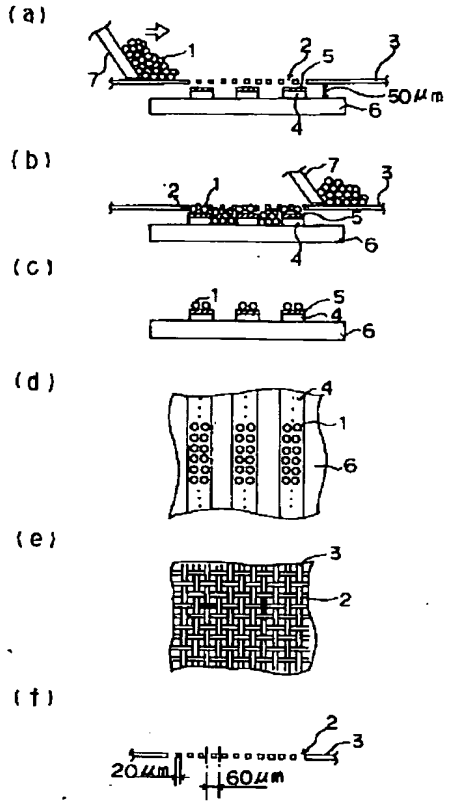
【図３】



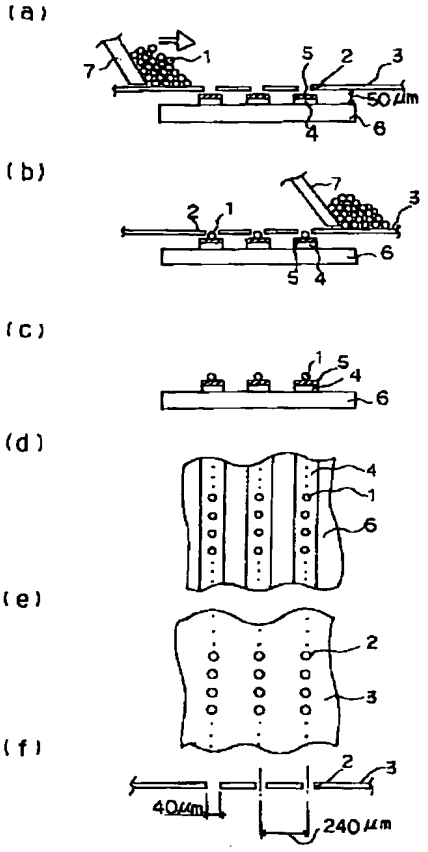
【図４】



【図５】



【図６】



* NOTICES *

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3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A connection method of electronic parts which connect electrically an electrode terminal of the 1st electronic parts and an electrode terminal of the 2nd electronic parts which are characterized by providing the following through an electric conduction particle, and fix these 1st electronic parts and these 2nd electronic parts with insulating adhesives A production process which arranges a puncturing board member which has an aperture which can pass this electric conduction particle on these electronic parts so that this aperture may come on this electrode terminal Subsequently, a production process which is made to pass this aperture of this puncturing board member, and arranges this electric conduction particle on this electrode terminal of these puncturing circles
[Claim 2] Said puncturing board member is the connection method of electronic parts according to claim 1 characterized by thickness consisting of a mesh smaller than particle size of said electric conduction particle.
[Claim 3] Said puncturing board member is the connection method of electronic parts according to claim 2 characterized by width of face of an aperture consisting of a mesh with a particle size of said electric conduction particle smaller than twice.
[Claim 4] Said puncturing board member is the connection method of electronic parts according to claim 1 characterized by a predetermined path and a predetermined number of holes consisting of a mask formed by predetermined pattern.
[Claim 5] Said puncturing board member is the connection method of electronic parts according to claim 4 characterized by a bore diameter consisting of a mask with a particle size of said electric conduction particle smaller than twice.
[Claim 6] A connection method of electronic parts according to claim 1 to 5 characterized by attracting this electric conduction particle in said direction of an electrode terminal of these puncturing circles by magnetic magnetism in case said aperture of said puncturing board member is made to pass said electric conduction particle.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the connection method of electronic parts, and in detail, it relates to the connection method of the electronic parts which can fix the particle number of the electric conduction particle on each electrode, and can make small dispersion in connection resistance inter-electrode [each] while it can respond to a fine pitch, without being able to apply to the connection technology of a liquid crystal display and electrical circuit components (wiring substrate), such as an external drive circuit (TAB), and making it short-circuit by contiguity inter-electrode especially.
[0002]
[Description of the Prior Art] About the interconnect method of an electrode terminal, there are some which were reported, for example by JP,3-289070,A conventionally. Here It is the method of arranging an electric conduction particle alternatively to the electrode terminal with which adhesives were formed, and obtaining connection. Specifically In the interconnect method of the electrode terminal which is made to connect electrically the electrode terminal of the 1st electrical circuit base, and the electrode terminal of the 2nd electrical circuit base mutually through a conductive particle, and carries out maintenance immobilization with adhesives To the electrode terminal projected from the base material surface of one [at least] electrical circuit base After forming adhesives and adhering a conductive particle to these adhesives, insulating adhesives are used for the 1st electrical circuit base and the 2nd electrical circuit base. A pressure welding and by constituting so that it may connect It has the advantage that it is connectable, maintaining an electric insulation of the electrode terminal which adjoins the electrode terminal arranged by high density.
[0003] Now, like the well-known example which roughly divided into the connection method of the electronic parts of an electric conduction particle mediation mold, and those with two kind and one mentioned above, after fixing an electric conduction particle on the electrode of one circuit board, it is a method corresponding to a fine pitch in connecting with the circuit board of another side, and another is the method of connecting the vertical circuit board through what distributed the electric conduction particle in adhesives, such as an anisotropy electric conduction film, conventionally.
[0004]
[Problem(s) to be Solved by the Invention] However, by the conventional method of connecting the vertical circuit board through the adhesives which distributed the above-mentioned electric conduction particle, since it corresponds to a fine pitch, if grain density of the electric conduction particle in adhesives was made high, since an electric conduction particle existed also in inter-electrode [adjoining], there was a problem of being easy to short-circuit by contiguity inter-electrode.
[0005] Moreover, by the conventional method of JP,3-289070,A of the above-mentioned well-known example, since the vertical circuit board is connected after fixing an electric conduction particle on the electrode of the circuit board which is one side beforehand, it has the advantage that it can respond to a fine pitch rather than the case where the adhesives with which the above-mentioned electric conduction particle was distributed are used. However, by sticking the electrode of the circuit board with which the

electric conduction particle was sprinkled and put in order in electric field, and the adhesives layer was formed on the plane substrate by this method to the plane substrate with which the electric conduction particle was sprinkled If the electric conduction particle is arranged on the electrode of the circuit board and an electric conduction particle is arranged in on a plane substrate by spraying in this way, the number of electric conduction particles with which the array density of the electric conduction particle on a plane substrate is arranged on dispersion, consequently the electrode of the circuit board will also vary.

[0006] For this reason, the particle number of the electric conduction particle on each electrode tended to change, and in this way, when the particle number of the electric conduction particle on an electrode changed, there was a problem that the variation in connection resistance became large by each inter-electrode one. Moreover, the opening electrode might be produced when the density of the electric conduction particle on a plane substrate became extremely low. Then, this invention aims at offering the connection method of the electronic parts which can fix the particle number of the electric conduction particle on each electrode, and can make small dispersion in connection resistance inter-electrode [each] while it can respond to a fine pitch, without making it short-circuit by contiguity inter-electrode.

[0007]

[Means for Solving the Problem] In a connection method of electronic parts which invention according to claim 1 connects electrically an electrode terminal of the 1st electronic parts, and an electrode terminal of the 2nd electronic parts through an electric conduction particle, and fix these 1st electronic parts and these 2nd electronic parts with insulating adhesives With a production process which arranges a puncturing board member which has an aperture which can pass this electric conduction particle on these electronic parts so that this aperture may come on this electrode terminal, subsequently It is characterized by including a production process which is made to pass this aperture of this puncturing board member, and arranges this electric conduction particle on this electrode terminal of these puncturing circles.

[0008] As for said puncturing board member, invention according to claim 2 is characterized by consisting of a mesh smaller than particle size of said electric conduction particle by thickness in invention of the claim 1 above-mentioned publication. In invention of the claim 2 above-mentioned publication, said puncturing board member is characterized by width of face of an aperture consisting of a mesh of particle size of said electric conduction particle smaller than twice by invention according to claim 3.

[0009] Invention according to claim 4 is set to invention of the claim 1 above-mentioned publication, and is characterized by consisting of a mask formed by pattern predetermined [member / said / puncturing board] in a predetermined path and a predetermined number of holes. In invention of the claim 4 above-mentioned publication, said puncturing board member is characterized by a bore diameter consisting of a mask of particle size of said electric conduction particle smaller than twice by invention according to claim 5.

[0010] In invention above-mentioned claim 1 thru/or given in five, in case invention according to claim 6 makes said aperture of said puncturing board member pass said electric conduction particle, it is characterized by attracting this electric conduction particle in said direction of an electrode terminal of these puncturing circles by magnetic magnetism.

[0011]

[Function] In the connection method of the electronic parts which connect electrically the electrode terminal of the 1st electronic parts, and the electrode terminal of the 2nd electronic parts through an electric conduction particle, and fix these 1st electronic parts and these 2nd electronic parts with insulating adhesives in invention according to claim 1 After arranging the puncturing board member which has the aperture which can pass this electric conduction particle on these electronic parts so that this aperture may come on this electrode terminal, it constitutes so that this aperture of this puncturing board member may be passed and this electric conduction particle may be arranged on this electrode terminal of these puncturing circles.

[0012] For this reason, since an electric conduction particle can constitute the aperture of a puncturing board member so that only a predetermined number may enter, a puncturing board member can be arranged on electronic parts so that this aperture may come to the predetermined location on an electrode terminal, an aperture can be made to be able to pass the electric conduction particle of a predetermined number and it can arrange on the electrode terminal of puncturing circles, the electric conduction particle of a predetermined number can be arranged in the predetermined location on the electrode of electronic parts. Therefore, it can arrange so that an electric conduction particle may not come to contiguity inter-electrode, and it can respond to a fine pitch, without carrying out opening short-circuit by contiguity inter-electrode. And since only a predetermined number can form an electric conduction particle in the predetermined location on each electrode, the particle number of the electric conduction particle on each electrode can be made regularity, and dispersion in connection resistance inter-electrode [each] can be made small.

[0013] In invention of the claim 1 above-mentioned publication, said puncturing board member consists of invention according to claim 2 so that thickness may consist of a mesh smaller than the particle size of said electric conduction particle. For this reason, although an electric conduction particle will overflow and fall and an array will be confused when an electric conduction particle removes product rareness and a mesh to an aperture above two-layer if it is made a mesh thicker than the particle size of an electric conduction particle it can come out of an electric conduction particle further on an electrode terminal certainly, and can arrange so that an array may not be confused, when a mesh is removed from electronic parts, since the electric conduction particle with which an aperture will be filled up if it is made the mesh with thickness smaller than the particle size of an electric conduction particle like the above could be boiled further and it carried out. In addition, it is desirable at this time for an adhesives layer to be on an electrode terminal. And the number of electric conduction particles can be controlled with a more sufficient precision by making equal the number of the apertures on an electrode terminal using this mesh.

[0014] In invention of the claim 2 above-mentioned publication, said puncturing board member consists of invention according to claim 3 so that the width of face of said aperture may consist of a mesh of the particle size of said electric conduction particle smaller than twice. For this reason, since width of face of the aperture of a mesh can be made into the width of face which can pass only one electric conduction particle and one electric conduction particle can be passed from one aperture, the number of the electric conduction particles on each electrode terminal can be made equal by making equal the number of the apertures on an electrode terminal.

[0015] In invention of the claim 1 above-mentioned publication, said puncturing board member consists of invention according to claim 4 so that a predetermined path and a predetermined number of holes may consist of a mask formed by the predetermined pattern. For this reason, in being able to obtain the effect of the invention of the claim 1 above-mentioned publication, it can finish without carrying out the Ayr blow for removing the electric conduction particle which entered into inter-electrode since an electric conduction particle can be prevented from entering into inter-electrode with constituting inter-electrode so that a mask hole may come only on a cover and an electrode with a mask, and moreover, the location of the electric conduction particle on an electrode terminal can be suitably changed by changing a hole site suitably. Furthermore, since each aperture pattern is changeable suitably, it can respond extensively.

[0016] In invention of the claim 4 above-mentioned publication, said puncturing board member consists of invention according to claim 5 so that a path may consist of a mask of the particle size of said electric conduction particle smaller than twice. For this reason, since the bore diameter of a mask can be made into the magnitude which can pass only one electric conduction particle, the same effect as invention of the claim 3 above-mentioned publication can be acquired. In invention above-mentioned claim 1 thru/or given in five, in case said aperture is made to pass said electric conduction particle, it constitutes from invention according to claim 6 so that this electric conduction particle may be attracted in said direction of an electrode terminal of these puncturing circles by magnetic magnetism. For this reason, since an electric conduction particle can be made easy to give the force of the direction of an electrode terminal

of puncturing circles to an electric conduction particle by magnetic magnetism, and to pass to an aperture, an electric conduction particle can be certainly arranged on the electrode of puncturing circles.
[0017]
[Example] Hereafter, the example of this invention is explained with reference to a drawing.
(Example 1) Drawing 1 is drawing showing the connection method of the electronic parts which **(ed) in the example 1 of this invention (claim 1). In this example, as shown in drawing 1 (a), alignment of a longitudinal direction is performed so that an aperture 2 and an electrode 4 may be assembled in the circuit board 6 which consists of a TAB base film with which adhesives 5 were imprinted on the puncturing board member 3 which has the aperture 2 which can pass the electric conduction particle 1, and an electrode 4, and each puncturing board member 3 and circuit board 6 are held. At this time, in the vertical direction, as shown in drawing 2 , only the specific distance L detaches the puncturing board member 3 and the circuit board 6 so that the head of the electric conduction particle 1 and the upper limit section of the puncturing board member 3 which passed the aperture 2 and were arranged on the electrode 4 may serve as the same height.
[0018] Next, as shown in drawing 1 (b) and (c), by moving the electric conduction particle 1 on the puncturing board member 3, an aperture 2 is passed and the electric conduction particle 1 is arranged on the electrode 4 in an aperture 2. Since the circuit board 6 and the puncturing board member 3 have detached only a specific distance at this time, the electric conduction particle 1 is arranged one layer on an electrode 4. Next, as shown in drawing 1 (d) and (e), the electric conduction particle 1 is arranged only on the electrode 4 with which adhesives 5 were formed by removing the electric conduction particle 1 which entered between electrodes 4 by the Ayr blow.
[0019] And wiring structure can be acquired by connecting the electrode 4 of the circuit board 6, and electrodes, such as another circuit board, with insulating adhesives through the electric conduction particle 1. Thus, after arranging the puncturing board member 3 which has the aperture 2 which can pass the electric conduction particle 1 on the circuit board 6 so that an aperture 2 may come on an electrode terminal 4, it constitutes from this example so that the aperture 2 of the puncturing board member 3 may be passed and the electric conduction particle 1 may be arranged on the electrode terminal 4 in an aperture 2. For this reason, the electric conduction particle 1 constitutes the aperture 2 of the puncturing board member 3 so that only a predetermined number may enter, and the puncturing board member 3 is arranged on the circuit board 6 so that this aperture 2 may come to the predetermined location on an electrode terminal 4. Since an aperture 2 can be made to be able to pass the electric conduction particle 1 of a predetermined number and it can arrange on the electrode terminal 4 in an aperture 2, the electric conduction particle 1 of a predetermined number can be arranged in the predetermined location on the electrode 4 of the circuit board 6. Therefore, it can arrange so that the electric conduction particle 1 may not come between the contiguity electrodes 4, and it can respond to a fine pitch, without carrying out opening short-circuit between the contiguity electrodes 4. And since only a predetermined number can form the electric conduction particle 1 in the predetermined location on each electrode 4, the particle number of the electric conduction particle 1 on each electrode 4 can be made regularity, and dispersion in the connection resistance between each electrode 4 can be made small.
(Example 2) Drawing 3 is drawing showing the connection method of the electronic parts which **(ed) in the example 2 of this invention (claim 2). In this example, what consists of a micro pearl Au (a nucleus is Au plating and the particle size of 40 micrometers to nickel plating and its outside in an outside with resin) is used for the electric conduction particle 1 using what becomes the circuit board 6 from a TAB base film (pitch 0.20mm, four electrodes of 0.1mm, electrode 4 height of 35 micrometers). The TAB base film circuit board 6 which formed UV hardening mold adhesives 5 by the thickness of 10 micrometers on the electrode 4 first in this example, By 80 micrometers, as shown in drawing 3 (a), the width of face of an aperture 2 shown in drawing 3 (e) and (f) the puncturing board member 3 which line breadth becomes [20 micrometers (a pitch is 1/2 of TAB electrode 4 pitch at 0.10mm), and thickness] from the mesh which is 20 micrometers 45 micrometers of distance of mesh puncturing board member 3 lower limit and TAB base film circuit board 6 upper limit are detached, and they is held. Subsequently, as shown in - (d), according to the same process as the example 1 mentioned above, the electric

conduction particle 1 is arranged on the drawing 3 (b) electrode 4 with which the aperture 2 of the puncturing board member 3 was passed, and adhesives 5 were formed. In addition, after removing the puncturing board member 3 from the circuit board 6, the electric conduction particle 1 which entered between electrodes 4 is removed by the Ayr blow like an example 1. A squeegee 7 is used as a migration means of the electric conduction particle 1 at this time. Moreover, although one apertures 2-4 of the mesh puncturing board member 3, 3, and 2 or 1 electric conduction particle 1 pass, the electric conduction particle number on one electrode 4 comes to spread abbreviation etc.

[0020] And wiring structure can be acquired by connecting the electrode 4 of the circuit board 6, and electrodes, such as another circuit board, with adhesives through the electric conduction particle 1. Thus, the puncturing board member 3 consists of this examples so that thickness may consist of a mesh smaller than the particle size of an electric conduction particle. For this reason, although an electric conduction particle will overflow and fall and an array will be confused when an electric conduction particle removes product rareness and a mesh to an aperture above two-layer if it is made a mesh thicker than the particle size of an electric conduction particle since the electric conduction particle 1 with which an aperture 2 is filled up can be boiled further and can be carried out, if it is made the mesh puncturing board member 3 with thickness smaller than the particle size of the electric conduction particle 1 like the above when the mesh puncturing board member 3 is removed from the circuit board 6, certainly, it can come out further on an electrode terminal 4, and the electric conduction particle 1 can be arranged so that an array may not be confused. And the number of the electric conduction particles 1 can be controlled with a more sufficient precision by making equal the number of the apertures 2 on an electrode terminal 4 using this mesh puncturing board member 3.

(Example 3) Drawing 4 is drawing showing the connection method of the electronic parts which **(ed) in the example 3 of this invention (claim 4). Although the example 2 explained the case where a mesh was used for the puncturing board member 3 If the puncturing board member 3 which turns into the puncturing board member 3 from a 20-micrometer [in thickness] and pitch 0.20mm mask at this example with the bore diameter of 80 micrometers shown in drawing 4 (e) and (f) instead of a mesh is used Since the array process of the electric conduction particle 1 is the same as an example 2 as shown in drawing 4 (a) - (d), the explanation is omitted.

[0021] Thus, the puncturing board member 3 consists of this examples so that a predetermined path and a predetermined number of holes may consist of a mask formed by the predetermined pattern. For this reason, since the electric conduction particle 1 can be prevented from entering between electrodes 4 with constituting between electrodes 4 so that the mask hole 2 may come only to a cover and an electrode 4 by the mask puncturing board member 3, it can finish without carrying out the Ayr blow, and, moreover, the number and location of the electric conduction particle 1 on an electrode terminal 4 can be suitably changed by changing the number and location of a hole suitably. Furthermore, since each aperture pattern is changeable suitably, it can respond extensively.

(Example 4) Drawing 5 is drawing showing the connection method of the electronic parts which **(ed) in the example 4 of this invention (claim 3). In this example, what consists of a micro pearl Au (a nucleus is Au plating and the particle size of 350 micrometers to nickel plating and its outside in an outside with resin) is used for the electric conduction particle 1 using what becomes the circuit board 6 from a TAB base film (pitch 0.24mm, four electrodes of 0.12mm, electrode 4 height of 40 micrometers). The TAB base film circuit board 6 which formed UV hardening mold adhesives 5 by the thickness of 10 micrometers on the electrode 4 first in this example, By 40 micrometers, as shown in drawing 5 (a), the width of face of an aperture 2 shown in drawing 5 (e) and (f) the puncturing board member 3 which line breadth becomes from 20 micrometers (it is 1/4 of TAB electrode 4 pitch at pitch 60micrometer), and a mesh with a thickness of 20 micrometers 50 micrometers of distance of mesh puncturing board member 3 lower limit and the TAB base film circuit board 6 are detached, and they is held, and as shown in drawing 5 (b) - (d), according to the same process as the example 1 mentioned above, it arranges on an electrode 4. In addition, after removing the puncturing board member 3 from the circuit board 6, the electric conduction particle 1 which entered between electrodes 4 is removed by the Ayr blow like an example 1. A squeegee 7 is used as a migration means of the electric conduction particle 1. Since one

electric conduction particle 1 passes from one aperture 2 of the mesh puncturing board member 3 at this time, the electric conduction particle number on one electrode 4 becomes equal.
[0022] And wiring structure can be acquired by connecting the electrode 4 of the circuit board 6, and electrodes, such as another circuit board, with adhesives through the electric conduction particle 1. Thus, the puncturing board member 3 consists of this examples so that the width of face of an aperture 2 may consist of a mesh with a particle size of the electric conduction particle 1 smaller than twice. For this reason, since width of face of the aperture 2 of the mesh puncturing board member 3 can be made into the width of face which cannot pass one electric conduction particle 1 and one electric conduction particle 1 can be passed from one aperture 2, the number of the electric conduction particles 1 on an electrode terminal 4 can be made equal.
(Example 5) Drawing 6 is drawing showing the connection method of the electronic parts which **(ed) in the example 5 of this invention (claim 5). Although the example 4 explained the case where a mesh was used for the puncturing board member 3 If the puncturing board member 3 which turns into the puncturing board member 3 from a 20-micrometer [in thickness] and pitch 0.24mm mask at this example with the bore diameter of 40 micrometers shown in drawing 6 (e) and (f) instead of a mesh is used Since the array process of the electric conduction particle 1 is the same as an example 3 as shown in drawing 6 (a) - (d), the explanation is omitted.
[0023] Thus, the puncturing board member 3 consists of this examples so that a path may consist of a mask with a particle size of the electric conduction particle 1 smaller than twice. For this reason, since the bore diameter of the mask puncturing board member 3 can be made into the magnitude which can pass only one electric conduction particle 1, the same effect as the above-mentioned example 4 can be acquired.
(Example 6) Drawing 7 is drawing showing the connection method of the electronic parts which **(ed) in the example 6 of this invention (claim 6). This example explains only the feature portion concerning claim 6 concretely. As shown in drawing 7 , a magnet 8 is arranged to the TAB circuit board 6 down side, and nickel plating performs and consists of this examples to the electric conduction particle 1.
[0024] Thus, in case the aperture 2 of the puncturing board member 3 is made to pass the electric conduction particle 1, it constitutes from this example so that the electric conduction particle 1 may be attracted by magnetic magnetism. For this reason, since an aperture 2 can be made easy to give the force of the electrode 4 direction of [in an aperture 2] to the electric conduction particle 1 by magnetic magnetism, and to pass, the electric conduction particle 1 can be certainly arranged on an electrode 4.
[0025]
[Effect of the Invention] While being able to respond to a fine pitch according to this invention, without making it short-circuit by contiguity inter-electrode, it is effective in the ability to fix the particle number of the electric conduction particle on each electrode, and make small dispersion in connection resistance inter-electrode [each].

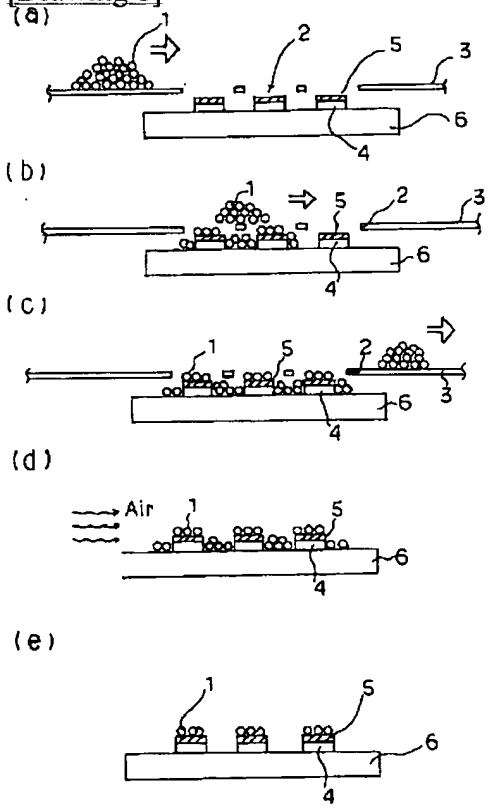
[Translation done.]

* NOTICES *

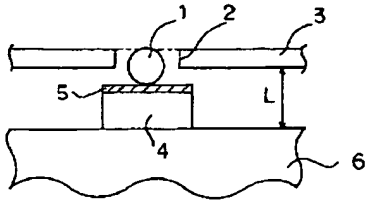
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

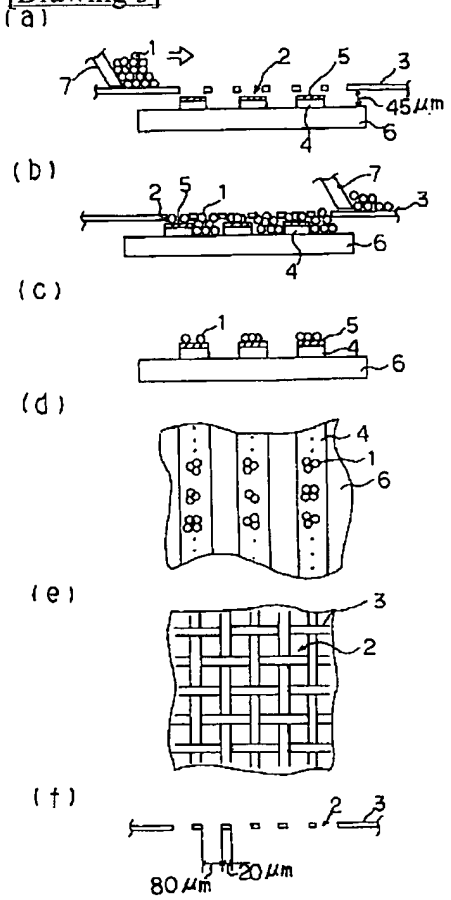
[Drawing 1]



[Drawing 2]

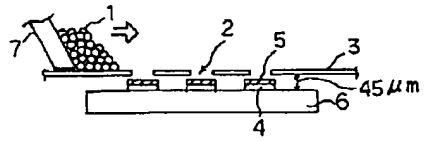


[Drawing 3]



[Drawing 4]

(a)



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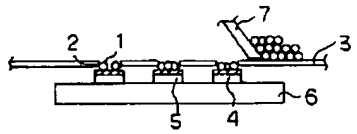
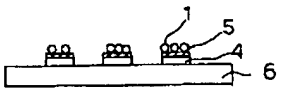
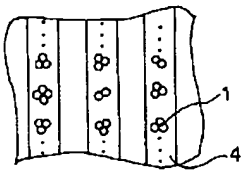


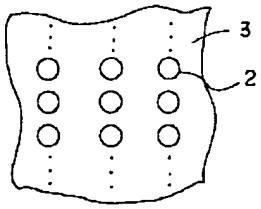
(c)



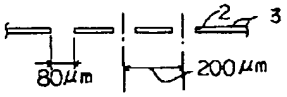
(d)



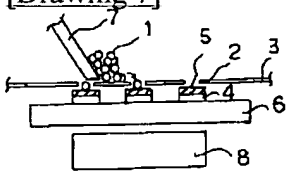
(e)



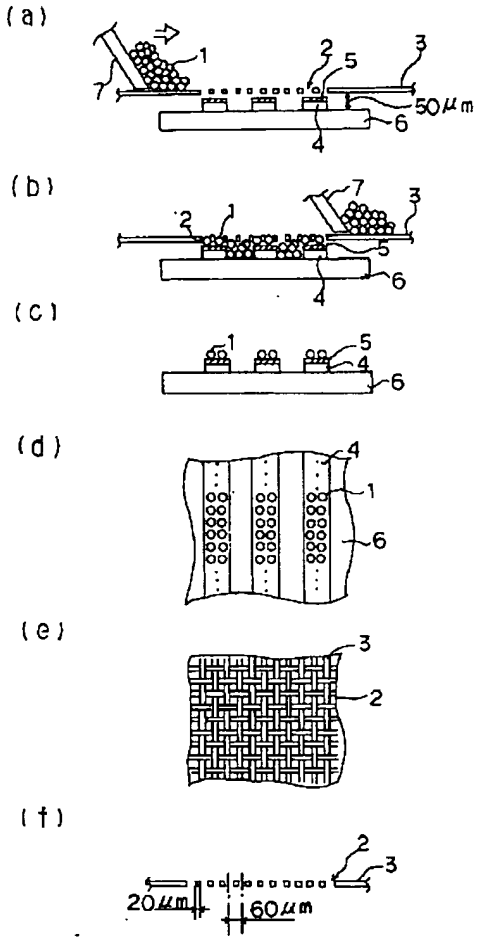
(f)



[Drawing 7]

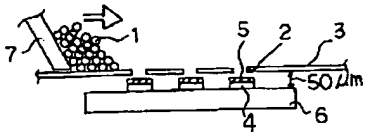


[Drawing 5]



[Drawing 6]

(a)



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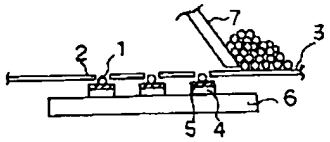

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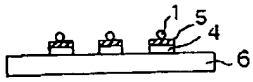
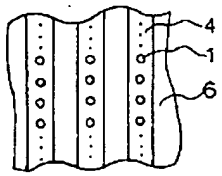


(d)



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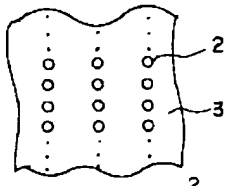
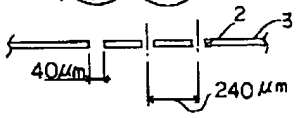


(f)



[Translation done.]